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DISSERTATION TITLE: *Petroleum Systems of the Barents Sea – A geochemical study for improved petroleum system understanding*

Geokjemiske analyser av 50 oljer og kondensater viste at det finnes fire forskjellige petroleumsfamilier i det sør-vestlige Barentshavet. Analyse av modenhets-, facies- og altererings parametere viste at mange oljer er «blandinger» av oljer fra to eller flere kildebergarter.

In this thesis Ph.D. student Benedikt Lerch investigates petroleum systems of the Barents Sea applying organo-geochemical methods. The approach to analyze the petroleum samples as three hydrocarbon classes, i.e. light hydrocarbons (C₄-C₈), medium range hydrocarbon (C₁₀-C₂₀) and biomarker range hydrocarbons (C₂₀₊) resulted in several basin scale trends that help to better understand the present distribution and composition of the petroleums investigated.

Geochemical analyses of 50 oils and condensates from the south western Barents Sea revealed the presence of four petroleum families, whose oils have been generated from Carboniferous, Permian/Triassic and Jurassic source rocks. Condensates mainly have been generated from Triassic and Jurassic source intervals.

Distinct maturity values and alteration parameters for the three respective compound classes indicate mixing of petroleums generated from two or more organic rich source rocks. In general, two trends that characterize most investigated oil samples have been found: (1) a C₂₀₊ fraction that represents palaeo-petroleum, i.e. the first petroleum charge that mixed with (2) a later arrived C₂₀₋ charge representing more recently migrated hydrocarbons.

Several alteration processes i.e. water-washing, fractionation and bacterial degradation have been detected in the database. The study found that, unlike than previously reported, bacterial degradation of petroleums in the Barents Sea can be considered an important alteration mechanism and thus is useful for deciphering entrapment mechanisms.

The results obtained during this Ph.D. study shed new light on the Barents Sea petroleum systems and can serve as future references.